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The JOURNAL of GEOGRAPHY

VOLUME XXII APRIL, 1923 NUMBER 4

RECENT DEVELOPMENT IN GEOGRAPHY TESTING*

P. R. STEVENSON
Bureau of Educational Research
Ohio State University

DIFFICULTY OF MEASURING GEOGRAPHY INSTRUCTION

Many satisfactory standardized tests have been devised for the tool subjects in the elementary grades. These not only meet the approval of the statisticians but of practical school people also. It is regrettable that this can not be said of the content subjects such as history and geography. The reason is quite evident. Objectives and minimum essentials for the tool subjects are relatively well established; while educators are far from agreement on the content of courses in geography and history. A study of the curricula of different cities will show that the arithmetic taught in the fifth grade is quite similar; but the geography is likely to differ widely. In one city the course of study for the sixth grade will emphasize geography of the World, in another the United States, and in still another South America. Again, we find some cities in which geography is not taught after the sixth grade; while in others, it is carried not only thru the eighth grade but also into the high school.

The greatest difficulty of all is presented by the extent of the subject. The field covered by geography is so broad that no school can be expected to cover it thoroly. For this reason it is necessary to limit test questions to those phases of the subject concerning the value of which there will be little or no difference of opinion. Care must be taken that no particular division of the subject be overemphasized. Most careful judgment must be exercised in deciding how much of any one topic the pupils in each grade should be expected to know. With such conditions existing it is impossible for the test maker to devise a scale in geography which is adaptable to pupils of all the elementary grades. It is also impossible to devise a test which may be used in a given grade thruout the United States.

* Presented at the Ann Arbor meeting of the National Council of Geography Teachers, December 26, 1922.

EARLY GEOGRAPHY TESTS

In spite of these difficulties several authors have devised tests which attempt to measure different phases of geographic instruction. The "Hahn-Lackey Scale" was the pioneer tool for measuring the teaching of geography and has been used for several years. The difficulty of such a test and most of the other earlier tests lies in the fact that pupils are allowed to answer questions in sentences of their own composition. Under such conditions it is almost impossible for the teacher to rate the papers objectively. For example, when pupils are asked such questions as, "Why is New York so important as a dairying state?" a great variety of answers is possible, ranging from those having no value to those which are exceptionally good. The answer which one teacher rejects may be given one-half credit by another teacher, and full credit by still another. If the different papers can not be scored objectively, there is no accurate way to compare the relative standing of different pupils or of different classes.

CRITERIA FOR JUDGING THE EFFICIENCY OF EDUCATIONAL TESTS

When judging the value of a test in geography or in any other subject, several factors should be taken into consideration: (1) Does the test measure what it purports to measure, and is this what should be measured? This factor which is without doubt the most important one, is generally known as "validity." (2) Is the test reliable, i. e., does it yield the same results when given at different times under similar conditions? (3) Does the test possess objectivity? By this question we inquire whether the directions for giving the test and trial exercises are so explicit that similar results will be obtained by different teachers giving the test; and whether the pupils' answers are of such a nature that they can be rated by means of a key. If these requirements are satisfied the scores obtained will be comparable when the papers are graded by different teachers. (4) Have suitable age or grade norms been established for the tests? The number of cases upon which many of the earlier and some of the later tests have been standardized are entirely too small to give a reliable basis for comparing the results of a given class. (5) Does the test differentiate between pupils of different abilities, i. e., can the teacher find out which pupils are doing very good work, average work, and very poor work from the given test? (6) Is the test of such interest that the pupils will put forth their maximum effort? (7) Are there two or more comparable forms of the test so that the scores made during one part of the

semester can be compared with those made in another part; in other words, is it possible to measure the growth made by pupils during a given time? (8) Is the test an economical measure of the product desired in the terms of money and time spent in giving and scoring it?

RECENT GEOGRAPHY TESTS

With these criteria in mind, several authors have devised geography tests which may be given and scored in an objective manner. These tests, however, measure only a narrow phase of geographic instruction. The "Courtis Supervisory Test" is limited to the location of states and cities in an outline map of the United States. The "Boston Research Test in Geography" published in 1919 deals with the location of cities and problem questions which are based entirely upon United States geography. The problem questions in this test, however, can not be scored objectively. The Boston test published in 1922 is devised for the eighth-grade pupils only, and is composed of forty statements, twenty false and twenty true. These statements represent work done in the elementary grades and include questions on all the different continents. The "Posey-Van Wagenen Geography Scales" are divided into two parts, one containing thought questions and the other information questions. This test is devised for pupils in the seventh and eighth grades and attempts to measure their knowledge of World Geography. The "New York Standard Geography Tests, Series A," published in 1922 are only partially objective, since the teacher would have difficulty in scoring some of the answers correctly. Series A is composed of eight separate tests which may be given to pupils from the fourth thru the eighth grade. Each of the eight tests is made up of twenty questions confined to a particular phase of the subject, as physical, mathematical, climatic, industrial, commercial, and place geography.

The "Witham's Standard Geography Tests" have one feature which makes them quite distinctive. There are tests for the World Geography and for each of the continents. This item is of particular value if we desire to measure the work of a group of pupils during a given semester. For example, if the pupils have been studying Europe intensively and have not had Asia or Africa, the test confined to items relating to Europe will be of greater advantage for showing the amount of improvement during a given time than one which attempted to measure many items which the pupils had not studied at all.

The "Gregory-Spencer Geography Test, Form A," for grades VI, VII, and VIII, present many interesting characteristics. The test is

composed of eight parts, each part attempting to measure a particular phase of geographical instruction. Part I is devoted to trade routes and their products; Part II, to miscellaneous geography (it might be called informational geography); Parts III and IV to causal geography; Parts VII and VIII to political and place geography. In devising this test the authors sought to include geographic content on all the continents with a special emphasis upon the United States. The main drawback to such a test is that it does not measure the amount of work during a given period of time but rather the results of geographic instruction during the past.

AN ATTEMPT TO DEVISE SUITABLE GEOGRAPHY TESTS

In 1920, while the author was at the University of Illinois, the Bureau of Educational Research was constantly receiving requests from the superintendents and research men for a geography test or a series of tests which would measure pupils' abilities in geography as satisfactorily as tests standardized in spelling, arithmetic, and reading. Finding no such test to recommend, the author and Doctor B. R. Buckingham began to investigate the possibility of constructing a series of geography tests which would meet both the requirements of public schools and the modern technique of test construction. After a careful study of the curricula offered in different cities and states, it was decided that no one technique of testing could be applied satisfactorily to the different kinds of geographic information. With this in mind, several types of tests were tried out to measure different phases of instruction.

BEST REASON TEST

To determine whether pupils in the elementary school had received instruction which enabled them to apply their knowledge in the solution of practical questions or problems, the "Best Reason Test" was devised. The exercises in this test consisted of a statement and four possible responses, only one of which was entirely correct. The pupils were asked to find the best reason and place a check mark before it. For example, the following exercise was given. Nevada has a light rainfall because (1) the climate of Nevada is too warm, (2) there are many deserts in Nevada, (3) the crops can be cared for by irrigation, (4) the moisture is lost before the winds cross the mountains. Exercises of this type allow the pupils to solve a given problem with data before him and indicate his response without writing a lengthy statement. It also may be scored quickly and objectively by the teacher.

INFORMATION TEST

In order to obtain a large amount of information from the pupil in a short time, a true, false, or alternative-question test was devised. The exercises were so arranged that the pupil was asked merely to write the answer "no" after each question he considered wrong, and "yes" after each question which seemed correct. To eliminate the possibility of guessing, the teacher was asked when scoring the papers to subtract from the number of correct answers those which were incorrect. This type of test has many friends because of its simplicity and ease in scoring. It also has many enemies who object to it because it is not at all diagnostic, and because it places incorrect statements or questions before the pupils.

PLACE TEST

Several kinds of "Place-Geography Tests" were tried out. In one type of test the pupils were given an outline map of the United States upon which no names appeared. Each state, however, was indicated by a number. All questions were answered by using these numbers. In another type of test the pupil was asked to answer questions using a code card upon which the names of the states were arranged alphabetically and each one given a number. In a third type of test the teacher read questions, which the pupils answered by using the abbreviations or names of the appropriate states, e.g., In what state is Chicago located? The answer is, of course, Ill., or Illinois. Correlations made from the data on these three place-geography tests were so high that the authors felt justified in using any one of them.

VOCABULARY TEST

To measure the pupil's ability in vocabulary, exercises were constructed in which the pupils were asked to read a definition in which a part was omitted and to choose the omitted word from a column of words arranged alphabetically, each one of which was given a particular number. For example, the following was given: A body of land entirely surrounded by water is called an ————. The pupils were asked to write the number of the word which made a true statement.

These four types of tests were given to a large number of pupils in parts of the United States, the results tabulated, and the difficulty of the various items determined. From a study of these results and from criticisms and suggestions offered by superintendents and teachers, the authors of the test were in a position to select the more promising

types of tests and also to more accurately determine the content which should go into the tests.

COOPERATION OF GEOGRAPHERS

At this point the cooperation of a large number of geography teachers and supervisors was solicited. The printed forms of the test were sent out with the request that they be analyzed carefully for the purpose of offering criticisms and suggestions. The response received from these people indicated that a definite need for geography tests existed. As a result of the criticisms and suggestions received, the true and false information tests were eliminated. In their place was substituted the type of exercises which allows the pupil to select the correct answer from one of the four possibilities. For example, Which state raises the largest amount of cotton, Louisiana, Oregon, Michigan, or Massachusetts? Many valuable suggestions were received in regard to content of the tests, and several teachers took the trouble to suggest problems and questions which might be used. A minimum list of "Place-Geography" items was also selected with the aid of these people.[1]

One writer deplored the tendency for tests to be devised by specialists in education and statistics while the specialists in geography content had gone their own way. He further said that there is a need for the two groups of specialists to work together and to present the results of their findings not only thru general educational publications, but also thru special journals, and special books in the subjects. We were particularly interested in getting such a response, because we had long since decided that the advice of geography teachers was needed. Since then we have secured the cooperation of Professor Douglas C. Ridgley, now of Clark University, for the development of a series of geography tests.

PROPOSED SERIES OF GEOGRAPHY TESTS

It is the intention of the authors to develop a series of diagnostic tests in geography for each continent. The present plan is to include in this series in addition to the "Place-Geography" tests in vocabulary, information, and problems. Since modern methods of teaching geography emphasize the ability of pupils to apply their knowledge to practical situations, it is not necessary for the author to justify the problem and information tests.

[1] P. R. Stevenson, Minimum Essentials in Place-Geography. *Journal of Educational Research*, November, 1922. Pp. 300-06.

JUSTIFICATION OF PLACE TESTS

Emphasis upon place geography is likely, however, to draw a protest from the better geography teachers. The practical need of knowledge of place geography is demonstrated by the newspaper. Even in this simple expression of news the reader is confronted with the names of a large number of local and foreign places. From an examination of the first page of the *Columbus Dispatch*, October 1, 1922, it was found that Constantinople occurred eleven times, Ohio eight times, Washington, D. C., five times, Cleveland five times, Toledo four times, Athens (Greece) three times, United States three times, London three times, Smyrna two times, and nineteen other places outside of Ohio occurred one or more times. Of course, it is unreasonable to expect children to remember all places mentioned in newspapers or discussed in classrooms, nor is it possible for any school curricula to anticipate all of them. The location of certain important places, however, should be known by the pupils.

In a preliminary study including over seven thousand grammar grade children, it was found that the average elementary pupil's knowledge of place geography is limited. For example, only thirty-two percent of the pupils knew that Mt. Everest is located in Asia. The accuracy of responses of other items will be found in Table I. A similar investigation of elementary pupils' attainment in place geography for the United States was even more discouraging.

An individual reading the *Columbus Dispatch* on October 1, 1922 who did not have some knowledge of the world map and some of the important places on it would have been entirely unable to comprehend what was written. He would have known in a hazy way that something disagreeable had happened at some distance from his home—that would be about all.

NEED FOR VOCABULARY TESTS

Children are taught in the early grades to read narrations and stories. The vocabulary peculiar to this type of reading is different from that found in geographies. The average reader would be considerably surprised to look over a geography textbook and note the large number of technical or semi-technical words which occur. A large proportion of these words are not defined or explained. The difficulty which pupils find in geography textbooks may in a large degree be due to limited vocabulary. That such a difficulty does exist is quite evident from a study which has recently been made by Franzen

and Knight.[2] They found that five-sixths of the material in the first and one-half of the material in the second geography books is so difficult that the children of the grade in which they are begun can not read them understandingly. The child, therefore, who takes up the study of geography at the end of the fourth or fifth year of his school life is confronted with a large number of words which are entirely new to him, and also by many words which, altho he has seen them

TABLE I

ACCURACY OF RESPONSE ON SELECTED ITEMS

Questions	*Percent of pupils in grades V–VIII who answered these questions correctly*
Canada is on what continent?	91
The Rhine River is on what continent?	79
Bolivia is on what continent?	73
Cuba is located on what continent?	62
Bulgaria is on what continent?	59
Austria is on what continent?	58
The Seine River is on what continent?	53
The Sahara Desert is on what continent?	50
The Pyrenees Mts. are on what continent?	48
The Elbe River is on what continent?	47
Siam is on what continent?	44
Nearest what continent are the Hawaiian Islands located?	37
The Dead Sea is on what continent?	36
Lake Titicaca is on what continent?	33
Mt. Everest is on what continent?	32
Nearest to which ocean is Boston located?	78
Nearest to which ocean is San Francisco located?	70
Nearest to which ocean is Honolulu located?	46
Nearest to which ocean is Stockholm located?	40
Nearest to which ocean is Valparaiso located?	31

before, are used in a different sense. A study of the vocabulary of geography texts was made last year by a graduate student at Ohio State University.[3] In this study not only the words, but the number of times which each word occurred, was determined. As a basis of this study, one textbook was used, "A Beginning Book" by McMurry and Parkins, 1920. Table II shows some of the words together with the frequency of their occurrence.

[2] R. H. Franzen and S. B. Knight, Textbook Selection. Baltimore: Warwich and York, 1922. P. 94.

[3] E. R. Gabler, A Geography Vocabulary Study, *Jour. of Geog.*, March, 1923, p. 104.

It is the author's belief that a careful study of the children's vocabulary and their ability to learn new technical words would be very much worth while. It is quite likely that such a study would result in geography textbook writers placing at the beginning or at the end of each chapter of their books a list of difficult words together

TABLE II

SELECTED LIST OF WORDS FROM AN ELEMENTARY GEOGRAPHY TEXT WITH THE NUMBER OF TIMES THEY OCCURRED

Words	*Frequency of occurrence*	*Words*	*Frequency of occurrence*
region	147	arid	32
route	146	agriculture	29
product	142	irrigation	23
soil	107	vapor	23
climate	98	commerce	19
area	96	source	19
population	92	import	15
transportation	77	degrees	14
industry	71	sphere	8
level	58	sediment	7
surface	48	transcontinental	6
boundary	45	immigrant	6
occupation	40	dependencies	6
produce	40		

with their meanings. It is also possible that such an investigation would result in the rewriting of our geography textbooks. Before any reliable vocabulary test can be devised it will be necessary to make a detailed study of several beginning and advanced texts and also of some of the more important geography readers.

PRESENT STATUS OF NEW SERIES

Of the proposed tests the place-geography tests have reached the furthest steps of development. Even in the case of this test it is possible that radical changes will be made as soon as some of the minimum essentials are established for the different grades. The place geography as it now stands includes three forms of the "United States Test," each of which is composed of sixty exercises, and three forms of the "World Test," each of which is composed of seventy exercises. The distinguishing feature of these tests is that the pupils do not need individual printed blanks. One booklet for each teacher or school is all that is necessary. The pupils write their answer on

any ruled paper which happens to be used in the school. The cost of giving the test, consequently, is reduced to practically nothing since all the six forms are found in one twelve-page booklet.

One form of the "United States Information-Problem Test" has lately been received from the printers and is now being standardized. A large amount of material and a number of problems for each of the other continents are being worked upon. It will no doubt be several years before the series is completed.

In conclusion, the author wishes to point out that the unsatisfactory form of present geography test is due in a large degree to lack of universally accepted objectives and for the teaching of geography definitely determined minimum essentials for each grade. Without doubt the geography experts in the United States agree on general objectives for teaching geography, but they have not convinced the practical school administrator who too often determines the course of study.

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* These tests are not available for general use.

PORTO RICO, JAMAICA, AND MARTINIQUE

ROBERT S. PLATT
University of Chicago

PORTO RICO AND JAMAICA

It is unusual to find two places so much alike by nature as Porto Rico and Jamaica.[1] One general description will serve for both.

Each is an island in about 18° north latitude, strategically located with respect to each of the northern passages of the Caribbean. The area of each is a little less than that of the state of Delaware. In each the longer axis is east and west, and there is a mountain backbone extending thru the length of the island. The surface is rugged and

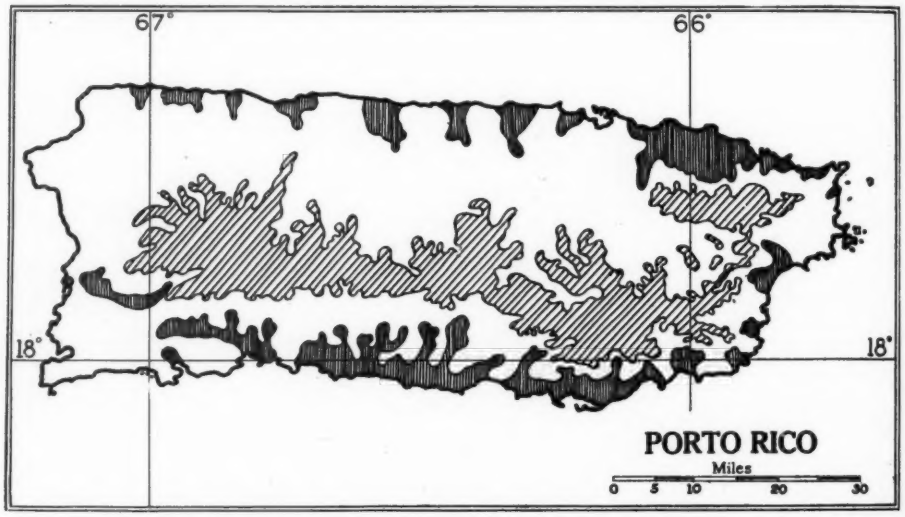

FIG. 1. Agricultural area of Porto Rico. Vertical parallel lines show areas of alluvial lowlands occupied for the most part by sugar cane. Oblique parallel lines show areas above 1000 feet in elevation within which most of the coffee is grown.

intricately dissected, and the only considerable flat areas are small valley lowlands near the coast. In the mountain backbone igneous

[1] A general map of the West Indies accompanied the first article in this series—January, 1923, p. 20.—*Editor.*

rocks are exposed, and elsewhere limestone prevails. Soils derived from both types of rocks are generally heavy, and reddish brown colors predominate.

Climate

Temperature changes from season to season are slight. At low elevations days are hot and nights are cool the year around; up in the mountains, the range of temperature is lower, but there is no place where frost occurs. Winds blow prevailingly from north and east—the Trade Winds. The relation of topographic features to these winds is an important factor in rainfall distribution. On the mountain slopes in the northeastern parts of the islands, the annual rainfall is more than 100 inches, and there is no marked dry season. Tree

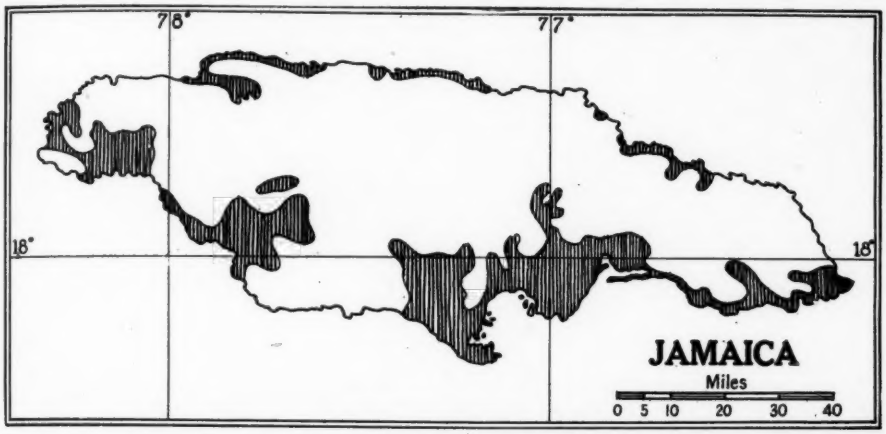

FIG. 2. Agricultural land in Jamaica. Vertical parallel lines show areas of alluvial and marl lowlands which, together with the adjacent slopes, are occupied in part by bananas.

ferns and other "hot house" plants flourish. Elsewhere in the mountains, and along the north and east shores, the annual amount of rain is less and there is a season of relatively little rainfall from December to April. But even in this season showers are frequent, and vegetation is green all the year. On the south and west slopes the annual amount in general is less than 50 inches, and there is a marked dry season for about half the year. During this season the land is dusty and brown, trees lose their leaves, and almost the only green things are xerophytic plants, such as cacti and irrigated crops.

Contrasts in Development

In spite of the similarity of the two islands in natural conditions, there is a striking dissimilarity in development, due to human elements which are in contrast on account of historical accidents rather than on account of the direct influence of environment.

Jamaica is a British Colony with a dense population of English speaking Negroes. Porto Rico is an American dependency with a still more dense population of Spanish white people.

In Porto Rico the fertile valley lowlands are occupied by sugar estates that fringe the island like a scalloped border. In each valley

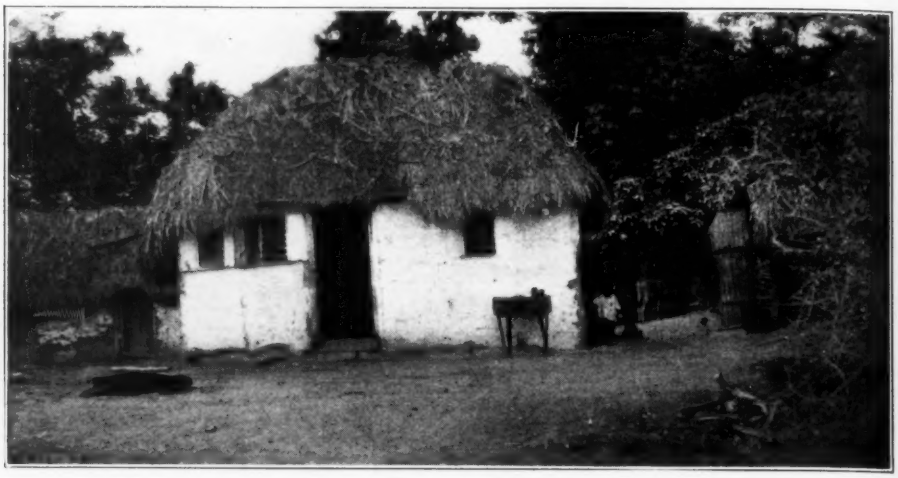

FIG. 3. A farm home in the interior of Jamaica

FIG. 4. A farm home in the interior of Porto Rico. Tobacco fields are shown in the background.

is a green expanse of cane, with the tall chimney and the red tin roofs of a modern "centrál"[2] in the midst. Sugar is the chief export of the island. On lands of the same type in Jamaica bananas are the chief

[2] Sugar mill.

crop. This fruit, which does not figure at all in the trade of Porto Rico, forms the principal item of export from Jamaica. Sugar cane is of secondary importance in Jamaica, and a considerable proportion of the crop is used to make rum instead of sugar.

FIG. 5. A Porto Rican tobacco field covered with cheese cloth

FIG. 6. A banana field in Jamaica

The mountain slopes of the interior of Porto Rico for the most part are bare of forests. Patches which have the aspect of woods are mostly coffee groves, and coffee is the chief crop of the interior. Highly cultivated land is conspicuous. Tobacco is grown as a commercial crop even on very steep slopes, and in some valleys acres of land are

covered with cheese cloth—sun shades under which is growing wrapper tobacco. In Jamaica, on the contrary, there is much forest land. Instead of coffee groves and tobacco fields there are "ruinate"[3] estates, and patches devoted chiefly to sustenance farming, each with a clump of fruit trees and a patch of root crops. In some places there are special commercial crops grown on a very small scale, ginger, allspice, and annatto.[4]

Causes of Contrasts

The main cause of these contrasts is found in political ties, past and present. Jamaica is a British colony. Porto Rico was a Spanish colony and is now an American territory. As a result of British plantation development in the past, Jamaica has a dense population of English speaking Negroes, and as a result of Spanish settlement

FIG. 7. Sugar cane plantation, with sugar mill in the midst, in a valley near the sea coast of Porto Rico

and a smaller amount of plantation development Porto Rico has a dense population of Spanish white people with only a minor mixture of colored blood. The lowland plantations of both islands were devoted to sugar production in former times, but in modern times the sugar of Jamaica has been driven from the market by British free trade and the American tariff, while Porto Rico as a part of the United States has access without tariff to the greatest sugar market in the world.

In Porto Rico the banana could not compete with sugar, but in Jamaica this crop has taken the place left vacant by the decline of

[3] Abandoned.

[4] A bush bearing seeds from which a dye is obtained for use in coloring oleomargarine and other food products.

sugar. The rugged interior of Jamaica has been left undeveloped, while the interior of Porto Rico has coffee groves as a result of Spanish encouragement and tobacco fields as a result of American enterprise.

The contrast is greater than that shown by a statement of products. Jamaica, with its Negro masses under half-hearted British rule, is not as bright a picture as Porto Rico, with an intelligent and responsive population, touched by American activity.

MARTINIQUE

Martinique is in the midst of the curving chain of islands at the eastern end of the Caribbean Sea. From its shores other links in the chain are visible to north and south, all similar in their general aspect, volcanic mountains more or less symmetrical in form, rising from the

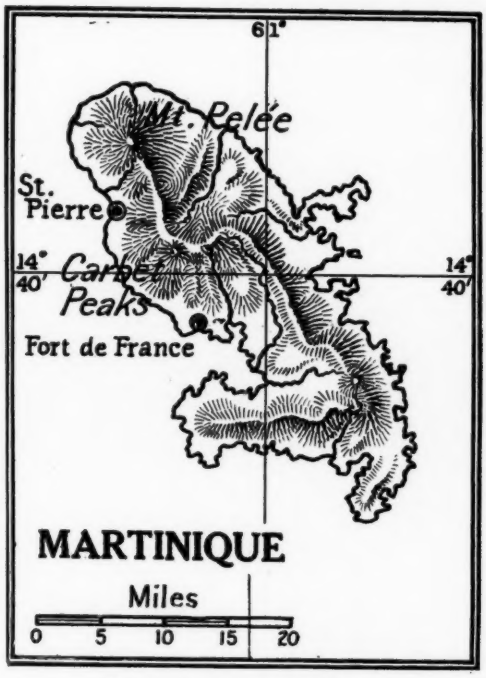

FIG. 8. Map of Martinique

sea. Martinique is larger than most of the other islands,[5] yet from a single mountain peak it is viewed from end to end, and the sea is visible in the distance on every side.

Three mountain masses form the bulk of the island, their slopes being steep on the west, but shelving off on the east in a rolling lowland several miles broad. The central mountain mass, Carbet, surmounted

[5] 380 sq. mi.

by a group of rocky pinnacles, is separated from the lower southern mass by a lowland gap and a broad bay. On this bay is situated the capital and commercial port, Fort de France. Carbet is separated

FIG. 9. Thatched cottage and farmyard in Martinique

FIG. 10. Women of Martinique on their way to market with baskets of produce balanced on their heads

from the northern mass, Mt. Pelee, by a narrow valley, near the mouth of which is St. Pierre.

Climate and Vegetation

The Northeast Trades blow constantly over the island, and the black beaches and headlands of the eastern coast are pounded constantly by the white surf. The mountain peaks generally are hidden by low lying clouds, and their slopes are drenched by passing showers. This is the climate of rainbows. The warm moist air on these mountain slopes gives the impression of a hot house and this impression is increased by the vegetation—everywhere a profusion of green shrubbery among which the lacy leaves of tree ferns and the broad leaves of wild bananas are conspicuous. The growth is not that of a forest, but of an overgrown evergreen garden. From a distance, mountain slopes look as if clothed in velvet.

Industries

On the lower slopes and rolling lands to the east are many pastures in which cattle graze; and in little lowlands are fields of sugar cane. In each valley near the coast is a small mill and rum distillery, surrounded by light green fields of growing cane or red brown fields newly plowed. Sugar and rum for the mother country, France, are the chief commercial products. Crops other than cane are not much in evidence—a few pineapples, a few lime trees, and household food crops in small dooryard patches, cassava, dasheen, sweet potatoes, and clustered groups of banana, mango, and breadfruit trees.

There is a mansion on each sugar estate, and neat thatched cottages are scattered along the road and grouped in numerous villages.

The People

The land is crowded with people,[6] Negroes, speaking French. They are poor and thriftless, lighthearted, friendly, and picturesque. Women are more conspicuous than men, dressed in bright colored calicos with flowing trains and red turbans. Gangs of them may be seen cutting cane in the fields, and on the roads streams of them striding along with trays of market produce balanced on their heads.

The most animated spot in the island is the market place in the substantial city of Fort de France, with its bright colored buildings and lively crowds. The most pitiful spot is the market place in the unsubstantial village of shacks that has grown up among the ruins of the city of St. Pierre, overwhelmed twenty years ago (1902) by the eruption of Mount Pelée.

[6] Pop. 184,000; 480 per sq. mi.

ITALY—A PROBLEM FOR SIXTH GRADE FOREIGN BOYS*

LURA A. CHASE
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To help a class of fifty-one "North End" boys to know something about the people of Europe and the way those people "work and live" was the problem which confronted me at the opening of school this fall. I believe as the months have gone by that we have been able to do a little towards the solution of our problem.

We began our work with a general study of Europe, its people, industries and physical features. The question, "Which of these countries would you like to think about first?" brought the almost unanimous response, "Italy."

I think one of the largest problems that a teacher in a "foreign district" has to face is the fact that it is almost an impossibility to bring the parents and the home into the school plans. The fathers and mothers are not lacking interest. Thru all the years of service with them I have found them loyal and friendly. But in almost all cases because of their limited education, their lack of knowledge of American ways and handicap of language, the boy has quickly grown away from his father. Unlike the American boy who goes to father's library and magazines and who has a common interest, the foreign boy soon outstrips his father and then comes the deplorable condition where boy is wiser (or would seem wiser) than his parent.

But with our study of Italy we had a delightful time. Some of my boys were born there and we found their former homes or cities near their homes on our maps. We talked of their journey here and the way they came, the "Ocean Liners" and the emigration laws. The boys who were born here had fathers and mothers from Italy, and cousins and aunts and grandmothers to whom the letters are going all the time. It seemed to me very much worth while to make much of this phase of our study because thru it I believe my lads have acquired a new regard for the land of their forefathers and respect for the knowledge of their fathers and mothers.

INDUSTRIAL STUDY

The industries of the people followed very naturally for the boys told of the work of their parents in the home country. In almost all cases they proved to be Italian peasants and agriculture in some form

* Paper presented at the Geographical Institute, State Normal School, Salem, Mass., April, 1922.

was their means of livelihood. From this almost imperceptibly the boys were studying the agricultural industries of Italy. They went to our "North End" branch of the Public Library for books where considerable material was obtained. The boys made a production map starting with the bare outline map. It was "fearfully and wonderfully made" but proved helpful and interesting. For illustration we wanted to know about the olive trees and the growth of the olive oil industry. Some members of my class found out about the machinery necessary for taking the oil out of the fruit and the oil of first, second and third qualities. Here the parents could help and did. One boy proudly told how his mother had done it herself with a little press something like the presses used in making wine here in their homes. A tiny bottle of the choicest of Italian olive oil was the offering of one mother to our table of exhibits.

The cultivation of grapes was a pleasant study. This brought us, of course, to a discussion of soil and right here we talked of Vesuvius and the soil produced by the lava and ashes which have been thrown out. The boys found that because of the marvelous productivity of that soil and the opportunities the slopes of the land in that region offered for grape culture, that people still live within sight of that menace to their lives, and the rumblings of its hidden furnaces do not disturb them.

The silk-worm culture was particularly interesting. The library loaned us a very good collection of pictures and charts "gotten out" by one of the great silk manufacturing companies. The study of these was most enjoyable. We hung them in their proper order and followed the life of the silk-worm thru its various stages to the winding of the raw silk and preparation for export to France, Germany, and Switzerland. The question, "Why is this sent away to be manufactured?" brought the answer of the limited manufacturing in Italy. Newspaper clippings showed how the Italian government is spending money to build more machinery for manufacturing. I might write more of our work in finding something about the agricultural industries of this country. But starting with an interest in all these industries they *did* learn of the climate and the hot summers that would have spoiled the possibilities for more than one crop if it had not been for the irrigation of the soil. They learned of the Po River and its fertile valley, and the Plains of Lombardi, and as I said before the rich soil formed from the volcanic deposition.

From the study of agriculture and the fact that it was the most important industry we turned to manufacturing and found that

lack of coal and iron was a serious drawback to that kind of work, but that water power and electricity were helping to overcome this difficulty. As a type of manufacturing in Italy I will just write of the macaroni making. Here again boys had help from home. Some visited a factory and told of the various processes. The mothers and fathers told them of its manufacture in Naples, of the streets lined with it in its drying process and we had specimens of macaroni in all its variations for the class table.

One father had just returned from Italy and loaned us some strings of beads and bits of jewelry which helped in illustrating the fact that manufacturing in Italy is quite different from the large scale in which it is carried on in our own country. Our table of interesting exhibits grew and we had Italian chestnuts, figs, rice, sulphur and even lava and ashes from Vesuvius to help us.

One father worked for a marble concern in Boston, and his son told us about polishing the marble and one of our choicest specimens was a bit of Carrara marble.

We did not label our study of cities as such but I found that as we studied our industries the cities came naturally. Transportation and trade meant that they located Naples and Rome and Genoa. They grew because they were the center of distribution for the "hinterland" (I did not use this word in class). The question as to how they could trade with Switzerland, Germany, and France without the help of "Ocean Liners" soon identified Milan and Turin as great internal commercial cities. Some of the boys found something about the St. Gothard and Simplon Tunnels which have helped so to establish an easy way of communication with central Europe.

Correlation with History

The geography of Europe is so closely connected with its history and our course of study so helpful in linking the two together that it would be impossible to teach one without the other. Genoa, the home of Columbus; Venice, the city built by fleeing Goths from the more barbarous Huns of the north; and Rome, the once great seat of the Roman Empire. They had loved the story of Horatius and the Tiber River is not just a crooked black line on their map. The Coliseum and Forum recalled the early days of the Roman Empire.

I had hoped to help my lads to appreciate a little of what Italy has given to the world in art, and our librarian was most kind in loaning us pictures of her choicest works of art, her finest buildings and her great people. I had hoped that a study of these would help them to realize that Italy had done much for the onward march of

civilization in the days gone by. I wanted them to feel that their relations over there had not been found wanting when the call came for service in the World War. The visit of General Diaz helped us to get this thought. The last and most vital to them, that because of this heritage of loyalty to native land of which they had so much reason to be proud, the fruit in their own lives would be loyalty to the land of their adoption.

For after all, the awakened interest in people and industries should mean, that as our lads grow to manhood a spirit of patriotism and love of America, its ideals and institutions has been inculcated in them while in our class rooms. And I know of no other subject in our course of study which so lends itself to this end.

Awakened Interest for Further Study

May I add just a word concerning the results of this study as my boys and I have worked together this year? Surely their interest has been stimulated for further study of the nations of Europe.

They have climbed the Alps Mountains, they have been over the battle fields of France. They have stripped bark from the cork oak of Spain and Portugal. They have carried iron ore from the Iberian Peninsula into Great Britain and gathered raw material from all over the world for those mighty mills of Manchester, Birmingham, Sheffield and Glasgow only to send the manufactured products out again to the people of the world. An interest in each country has been aroused thru its industries.

I wish I might have shown you their geography scrap books. Never once have I said "You must make these," but they have invaded the railroad and steamship offices for pictures. Their newspaper clippings have ranged from the latest fashion from Paris to articles on international relations.

All but one of my original class of fifty-one is still with me. I can't help but feel that this living geography is the cause for the statement made by one of the older boys as he lingered after school a week ago. "My father is coming to see you next week. I think he will let me stay in school another year if you will talk with him." And this from the boy who had come to us a stranger last October and at that time made it quite plain that just as soon as the law allowed he would ask for his working papers.

Ultimate Possibilities of Such Study

Is there any subject that we teach that takes any more of our ingenuity, our patient study and unfailing patience and careful

guidance? But is there anything in the whole curriculum that so lends itself in establishing a foundation for patriotism and service to country and all mankind, in the lives of our pupils? In these wonderful days of national rebuilding, and new international relations and ideals, we as teachers have a God given opportunity to sow seeds of citizenship that may bear fruit in the lives of our boys to such an extent as even in our fondest dreams we have not dared to hope.

The foreign born boy in an American public school has potential possibilities that may never be estimated.

TWO DOZEN CAUSES FOR THE LOCATION OF BLAST FURNACES AND STEEL MILLS IN THE UNITED STATES

O. W. FREEMAN

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Most teachers of economic geography have come to realize that the iron industry is one of the best to use in learning the geographic factors that influence the distribution of manufacturing establishments. The iron industry is so important and many of the reasons that control its distribution are so plain that it is easy for pupils to understand them and apply the principles learned to other industries.

The causes listed herein have been worked out by the pupils in the economic geography course in our high school from a careful and thoughtful study of the various standard textbooks and magazines in economic geography, engineering, mining and metallurgy. The writer has not seen some of the causes listed mentioned in the textbooks and reference books on geography, and it is thought that a list of them might be of use to other teachers. In this list the causes are not necessarily arranged in the order of their importance. In most cases several causes unite to determine the location of the industry and the original cause is often outgrown, but so far as is possible only cities where a given cause is effective today are used as examples.

APPLICATION TO FOREIGN COUNTRIES

Little thought is required for a class to see which of the geographic factors that influence the location of the industry in the United States are also at work abroad. They welcome as old friends the discovery that: Sheffield and Birmingham have iron ore and coal close together; the iron ore of Lorraine tends to go down hill to the coal of Westphalia; England having coal close to the sea, imports iron ore from

Spain, Sweden and elsewhere; Japan having a great market for iron and a fair supply of coal but lacking enough ore can profitably import ore from China; Spain has both iron ore and coal but lacks capital and experienced labor; lacking iron ore and coal Italy and Switzerland cannot make cheap bulky articles of iron in competition with England or Germany, Lorraine ore furnishes a valuable by-product in phosphate fertilizer so that lower grade ore can be used. They learn why Sweden, Spain, South America, Algeria, Cuba, Elba, China, and New Foundland export ore, and why the steel mills of the future will have a tendency to be built near the sea coast or on navigable bodies of water, and many other valuable principles.

GEOGRAPHIC FACTORS

1. Blast furnaces and steel mills are likely to be located where iron ore, coking coal and limestone are found close together. Example: Birmingham, where because of this proximity it is profitable to use ore much lower in grade than can be used from the Lake Superior fields. Much of Birmingham's iron ore is self fluxing, i.e., it contains so much lime that little more is needed in smelting it.

2. Usually it is cheaper to carry iron ore to coal than coal to iron ore, provided the iron is of high quality. Example: Pittsburgh District. It takes about three tons of coal to smelt a ton of iron so that the saving is obvious.

3. They often remain in a city because of the impetus of an early start and the reputation for their goods that the place has won. Example: Pittsburgh District including Youngstown.

4. They are located on the southern shores of the Great Lakes where iron ore is brought by boat and meets coal brought by rail. Examples: South Chicago, Gary, Cleveland, Toledo and Buffalo. Iron is smelted here cheaper than in Pittsburgh as there is one less handling of the ore. In the past, however, this difference in cost has not been passed on to the consumer as it has been the custom in the steel business to charge the Pittsburgh price plus the freight even if the buyer lived in Chicago and the steel was made there. So much complaint has been made against this practice by the large consumers of iron along the Great Lakes, they claiming with justice that it unduly favors the Pittsburgh manufacturer, that it probably will have to be modified.

5. Some plants are located on or near the sea coast where imported iron ore meets domestic coal. Example: Baltimore, Steelton, Allentown, and South Bethlehem. These cities get little ore from Lake

Superior or locally. It comes mainly from Cuba, Chile and New Foundland.

6. Such plants on the sea coast find it easy to export the manufactured iron and steel.

7. The selection of Duluth for the location of a large plant is partly a response to the advantage of keeping ore carriers busy both ways. This city is near the iron mines and convenient to the markets of the Northwest, but coal is the only bulky freight going up the Great Lakes and since the market was insufficient for all that could be carried it was advantageous to start furnaces and mills that would use the surplus so that the ore carriers would have cargo both ways.

8. Another factor is the long distance from the large centers of iron production and a considerable local demand. Example: Pueblo, which gets ore from Wyoming and coal from New Mexico as well as Colorado, and where the mines and railroads provide a steady altho small market. Colorado iron and steel cannot compete with Pittsburgh in the eastern markets, so a large industry at Pueblo cannot develop.

9. In some centers the industry is based more on scrap iron and imported pig iron than on the presence of iron ore. Examples: San Francisco, Worcester, Springfield, Providence, and Boston. These towns have a good market as they are a long distance to the blast furnaces and both freight and time can be saved by having heavy machines, ships, etc., made close by where they will be used. At this time, in spite of the high tariff, China and Belgium can deliver pig iron on the Pacific Coast cheaper than the eastern mills due chiefly to their cheap labor and depreciated money.

10. A large local market or good transportation to large markets is always necessary if the industry is to grow to large dimensions. Examples: Pittsburgh, Joliet, Gary and most of the other large centers making iron and steel.

11. They are sometimes located in foreign countries to evade tariff barriers. The United States Steel Company is erecting a plant opposite Detroit at Ojibway in Canada to supply the Canadian market without paying tariff duties. It can receive cheap raw material from the United States. The profits will return to this country so the plant can be considered to belong to the United States.

12. Iron and steel mills require a very large site and to get the land cheaper and save city taxes many companies put their mills outside the city limits. For example, outside Pittsburgh but really a part of its industrial district are Carnegie, Homestead, McKeesport, McKees Rocks, Braddock and Duquesne.

13. The presence of large supplies of timber for charcoal has in the past localized blast furnaces and is still a factor in some areas, such for example as in northern Michigan. Excellent iron is made in this way but it costs more. The cheapest charcoal is a by-product from saw mills.

14. Water power for electrical smelting may come to be a factor. An experimental furnace was erected to smelt iron in California but it could not compete in price with blast furnaces run by coke. However, it is possible that electric smelting may be applied successfully to making alloys.

15. Anthracite coal once was an important factor as at Scranton, Reading, Bethlehem, Lebanon and other towns in eastern Pennsylvania. The industry at these places now depends on bringing in both coke and iron ore.

16. An abundant supply of skilled labor and cheap immigrant labor is an important consideration. This gives the steel centers of Pennsylvania an advantage over interior cities.

17. Plants in the vicinity of large cities may find a market for the gas and other by-products made by the coke ovens that supply fuel for the blast furnaces, such as at Pittsburgh and Cleveland.

18. A manufacturer using large quantities of iron may decide to supply his own demands, and hence builds an iron and steel plant near his factory. Example: The Ford Motor Company at Detroit owns its own coal mines, its own iron mines and limestone quarries, its own railroad to transport coal, its own coke ovens and its own blast furnaces for smelting.

19. A plant may be built to manufacture or utilize by-products. Example: Beneath Detroit there are large beds of rock salt. This together with limestone and coke is used to make soda by the Solvay process. To supply the coke a by-product oven was erected and the gas and the additional ovens built to supply this demand made more coke than could be used to make soda. A blast furnace was therefore built to use the extra coke.

20. Some furnaces and mills are located midway between producing and consuming areas. Example: St. Louis. This city gets a little local ore but its ore is brought mostly by rail from Minnesota and Michigan. Coke may be brought from the East, but by an improved process Illinois coal is now made into good coke. To the west and southwest is a great iron consuming area. St. Louis is thus midway between producing and consuming areas and while it costs more to make iron there yet the saving on freight more than equalizes the difference.

21. The availability of capital is also a factor. All eastern and middle western centers have more capital than the West as they have been settled longer.

22. The willingness of ocean carriers to make low rates on pig iron for ballast to some ports is a favorable condition. Example: San Francisco. There are more bulky cargoes leaving the Pacific Coast than arriving, so low rates are quoted on heavy freight that can be imported.

23. Sites that enable iron plants to secure a variety of ores are advantageous. Better qualities of iron and steel may often be made by mixing ores from various sources. This is enjoyed by furnaces on the sea coast and Great Lakes as it is easier to secure ores there from widely scattered localities.

24. Some plants use the iron that is a by-product from smelting other ores. Example: The Franklin Furnace district of New Jersey where iron-zinc ores are smelted, the iron being a by-product. Usually it costs so much to extract and purify the iron found with other metals that the iron is thrown away, so that the use of the Franklin Furnace by-product iron is quite exceptional.

THE ELECTRICAL CONQUEST OF OUR WESTERN MOUNTAINS

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Our great West loves to boast of its wealth of potential water-power. It is enthusiastically estimated, and rightly, that seventy per cent of the minimum potential water-power of the United States is to be found in our eleven western states. It would seem however, upon careful investigation, that these figures are not as formidable as they at first appear. In other words they are like Chamber of Commerce statistics, true enough, but intended to bring out only the side of the question favorable to the locality under discussion. The figure, seventy per cent, does not disclose the fact that a high percentage of this power is probably forever inaccessible or impossible of development because of topography, distance from market, or competition with coal or other already developed hydroelectric projects.

One example will make the above discussion clear. In northeastern Washington the Pend Oreille river (Clark's Fork), which is usually a formidable stream of an average width of one-eighth of a mile, narrows and flows thru a canyon eighteen feet wide and with

side walls of rock from 400 to 500 feet in height. It is probably one of the finest potential waterpower sites in the United States, if we are to consider only the mechanical possibility of developing the power. Certain interests have spent thousands of dollars in making rock borings and measuring the flow of the river to ascertain the possibilities of the site. A little mountain town clings to the side of the valley and waits patiently, with all the enthusiasm of the true westerner for its great tomorrow which it expects will see the development of this magnificent project. What are the factors which are holding back this development? The project fails to develop because there is plenty of waterpower already developed in northern Idaho and Montana and farther south near Spokane. The market lies so far south that competition with coal is keen and finally the fear of the government nitrate project at Mussel Shoals, Alabama is an ever present menace. If the power of the Washington site were to be developed at this time it could only be used in nitrate fixation. Being located in such a remote part of the country and having the possibility of competition from the government project the reason is plain as to why the project is at a standstill.

The market for western water-power is in general limited to the following situations:

1. Municipal public utilities where competition with coal is not too keen. Since western population is limited in numbers this presents a small market.

2. Factories which would have to transport coal long distances. The type of factory in the West must be limited to those which manufacture a product which does not have to compete with the great factories of the Middle West or to those which can manufacture from western raw materials some product which has a large Oriental market.

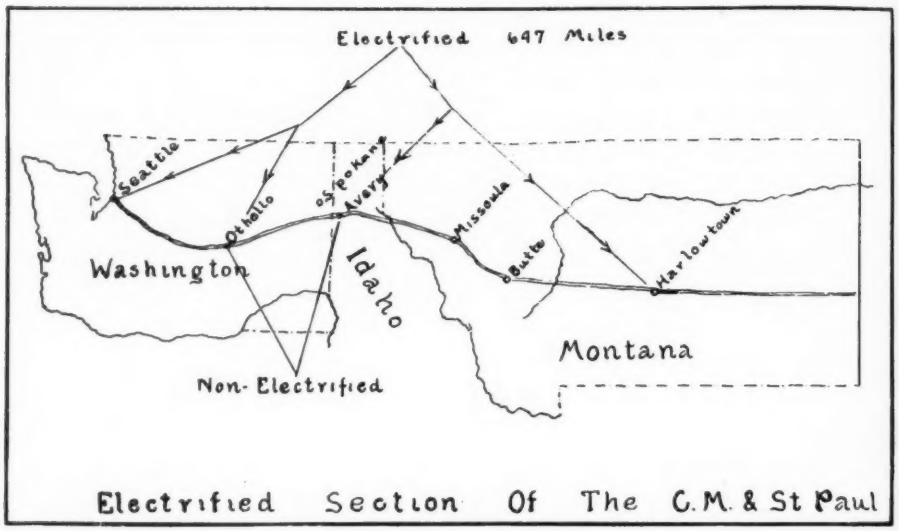
3. Irrigation projects. Time may develop a means of using hydroelectric power to pump water for irrigation. Unfortunately places where such power can be developed are too far away from flat land usable for irrigation.

4. Transportation routes which find coal too expensive, lacking in the necessary power to draw trains across the western mountains, or undesirable because of smoke, dirt, or the forest fire hazard.

It is the purpose of this paper to discuss the last mentioned case in an attempt to prove that the transportation routes of the western mountain region will furnish the best market for western hydroelectric power.

We shall use for our illustration the Chicago, Milwaukee, and St. Paul railroad which has electrified its system practically all the way from central Montana to the Pacific coast at Seattle and Tacoma. The information for this article has been obtained thru the courtesy of the managers of this road in permitting the author to ride in an electric locomotive over their road, and to literature which they have made available. The company is always willing to send well illustrated literature to teachers who will make use of it. To as great an extent as possible, technical terms and details have been omitted from this discussion.

No other railroad company has made such an important single step in electrification as has the Chicago, Milwaukee, and St. Paul. The Butte, Anaconda, and Pacific, the Great Northern, the New York,



Electrified Section Of The C.M. & St Paul

New Haven, and Hartford, the New York Central, the Boston and Maine, and a few other roads have electrified short sections of their systems. They use it for tunnel or terminal operation when they wish to get rid of the smoke nuisance but none of them use electric locomotives for more than one division. Consequently we may look upon the Chicago, Milwaukee, and St. Paul as being the pioneer in long distance railroad electrification.

The section of the road which is electrified consists of a mountain division from Harlowtown in central Montana to Avery in western Idaho, a distance of 440 miles and a coast division from Othello in east central Washington to Seattle and Tacoma, or another 207 miles. Totaling this milage we have 647 miles without counting sidings, or a

distance approximately equal to that between Chicago and Washington, D. C.

The ends of these two electrified divisions are separated by about a hundred miles of trackage which is not electrified, probably because the transcontinental trains, in order to get thru Spokane, run over another company's tracks. The mountain division was completed and put into operation in 1917 and the coast division in 1920.

Any railroad which crosses mountains must face the problem of steep grades, short-radius curves, and usually considerable elevations. The Chicago, Milwaukee, and St. Paul has all of these difficulties. In surmounting the Rockies there are several long grades of one per cent or more. One of the most difficult is a 21 mile climb of 2½ per cent and another of 49 miles of 1 per cent. In crossing the Cascades there is a 17 mile 2.2 per cent grade and one of 20 miles at 1.74 per cent. There are many curves, the maximum radius of which is ten degrees and this maximum is necessary in many places. In crossing the Rockies extreme elevations are reached in three places of 5,768 feet, 6,322 feet, and 4,700 feet. In crossing the Cascades the elevations are not as great being only about 3,000 feet but the grades are more serious. Numerous tunnels are necessary there being thirty-six in all, the longest of which is the St. Paul's Pass Tunnel of one and one-half miles. The significance of these grades, curves, elevations and tunnels will be apparent later in the discussion as comparisons are made with steam roads.

Power is transmitted over a strong copper wire similar to a trolley wire. It is suspended from a cable which is in turn supported at frequent intervals by steel arms. Every precaution is taken against the possibility of the wire breaking. A third rail system is out of the question because of snow and mechanical reasons. Power is taken from the wire by means of an ingenious device called a pantagraph. It slides along the wire instead of running on a wheel as does the ordinary street car trolley. There is double contact with the wire so that there is no such thing as an interrupted current and consequent sparking as is present on an ordinary trolley line.

The work of the road is handled by forty-two freight engines, fifteen passenger engines, and four switchers. The coach equipment is of the ordinary steel type. Freight locomotives are made in two units so it is possible to cut them apart and use them separately. The two-unit system also permits greater flexibility. The weight of such a locomotive is 288 tons as compared with the 278 tons of the largest steam engines. They are 112 feet long and can be operated from either

end so that turn tables are unnecessary. These great engines will haul a 2,500 ton train on all grades up to one per cent at an approximate speed of sixteen miles per hour as compared with the six or eight miles of a steam locomotive. Two of them are used to take freight trains over the mountains.

The passenger engines are smaller and speedier. They will haul a train of twelve steel coaches over a two per cent grade at twenty-five miles per hour. They can be operated from either end and the engineer's cab projects over the track much the same as the motorman's compartment in an ordinary street-car. The engines contain oil-burners which heat the train. As one sits beside the engineer, looks out over the splendid mountain ruggedness, and feels the train actually gather speed as it climbs the two per cent grades, he gets a feeling of a mighty power which is capable of conquering any mountain. Then down in the valley another railroad is seen with a steam locomotive struggling along with its train at an eight mile rate, belching forth clouds of smoke and soot, setting forest fires, and covering its passengers with smoke and cinders.

The power used by the road is supplied by various private companies which have developed the mountain streams. One such company is located at Great Falls, Montana, on the Missouri River, others are along the Missouri, and one large one is on the Clark's Fork at Thompson's Falls. The Coast Division gets its power from falls and dams in the Spokane River near Spokane and from the Snoqualmie Falls in the Cascades. The current is delivered to the railroad as a 100,000-volt alternating current. The road receives it thru its forty-six substations and reduces it to a 3,000-volt direct current. Each substation has its bungaloes and all necessary equipment for its employees.

One of the most interesting mechanical features of the operation of the road is its system of regenerative braking. As a train goes down a grade the motors are reversed, the weight of the train turns them and thus the motor becomes a generator and a brake. Where a steam train must use air brakes and faces a serious problem in descending such grades, the electric train is smoothly braked with no grinding of brake shoes and consequent wear on wheels and brake-shoes. The electricity thus generated goes back to the line and is credited to the railroad company. The air brakes are used as supplementary to the motors in stopping at stations or in an emergency.

Thus, briefly and untechnically, we see the manner in which this great trans-continental railroad has utilized a power which would have otherwise gone to waste. It is the highest type of conservation of

natural resources. The Chicago, Milwaukee, and St. Paul has been at an enormous expense in changing its road from steam to electricity. It must be that they have considered the advantages as worth their trouble and expense. Let us list the advantages of electricity over steam in such situations.

1. Greater and steadier power than steam
2. Absence of the fire hazard in forests
3. Absence of smoke and cinders
4. Absence of jerking when stopping and starting
5. No loss of power on cold mornings
6. Greater and smoother power in snow blockades
7. Each locomotive can run 1,000 miles or more without attention
8. No necessity of transporting coal and water
9. It conserves a natural resource

One has only to ride over these western mountains in an electrified train in order to sense the above advantages. No smoke and no cinders, no uncomfortable jerking to disturb one's sleep, full enjoyment of the wonderful scenery because of absence of smoke and cinders, and a consciousness of a mighty and reliable power fully controlled by man, make such a trip a pleasure long to be remembered. I believe that every other trans-continental railroad will be forced to electrify its mountain divisions. Some of them are already taking steps in that direction. This must come for competition will force it. Probably electrification in plains districts is far distant because of cheapness of coal. When this electrification comes thruout the western mountain regions it will furnish their best market for hydroelectric power.

A CATTLE RANCH IN NEW MEXICO

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Few people realize how large or important the ranching industry is, or how many problems the ranchman has to solve before his cattle are sold in the market; yet some product of the cow is used daily in every home in this country. Consequently some study of cattle raising as an industry should be of interest to every citizen of the United States.

A Representative Ranch

There is no part of our country where cattle have been raised more exclusively than on the Llano Estacado. Here, in all seasons

and in the summer especially, grazing cattle can be seen as far as the eye may chance to look. The raising of cattle on a big scale is more economical in general than small scale production, consequently, in this region there are many large ranches, tho the small ones are more numerous. In order to study typical ranching and its problems, let us consider a particular ranch on the eastern edge of New Mexico, on the divide between the Pecos and Canadian rivers. This ranch, of the "7–H" brand, is in Roosevelt County, near the little town of Delphos, some twelve miles from the county seat, Portales.

History of Owner

About 1900, there moved to the sparsely inhabited plains, near the present town of Lubbock, Texas, a man whom we shall call Hunt, bringing with him his wife, child, and his personal effects in a covered wagon. This man was reared near the place where Oklahoma and Arkansas corner with Texas. He was only an individual in the western march of civilization. Abiding here sufficient time to gain in property and vision, he, in the course of five years, again moved, a common American trait, and located near the New Mexico line, "taking up" a plot of ground, some 2,500 acres, in the district which was later organized as Andrews County, Texas. Here he began to build up herds of "white-faced" Herefords and do his bit to feed and shoe the nation's people. Not satisfied with a ranch of 2,500 acres, late in the year 1917, at the time of the great drought in western Texas, he, with others, leased land for a large ranch in Roosevelt County, New Mexico. This became the nucleus of the "7-H" ranch. With the increased profits made by selling his products at war-time prices, Mr. Hunt later was able not only to maintain his ranch in Texas but in addition to buy about six sections of the leased land, shown as shaded areas in Fig. 1.

Methods Used in Securing Ranch

The prices of the land thus purchased ranged from thirty-five cents to $15.00 per acre. As in other parts of the West, many thousands of sections of public lands in New Mexico were offered to new settlers, provided they would live on the plot for a period of time—which period was changed many times—and show some decided improvement of the land at the close of their required habitation. That portion of the land owned by Mr. Hunt in "7–H" ranch was thus secured by purchase from the Federal Government directly or from private persons who had previously homesteaded it; the leased part was secured from the state of New Mexico under the system of

competitive biddings, or from owners who live in distant towns or states, who had previously secured it by any or all of the various methods of alienating public, national, and state lands.

HOME OF HERDER

Mr. Hunt's confidence in his ranch as a suitable place for the production of meat has not been unfounded, tho the many problems of soil and climate that he has had to solve, have been severe tests of that faith. This region is a slightly rolling and undulating plateau, with small mesas or staked plains, standing at an average elevation of about 3,600 feet. It forms a part of the High Plains.

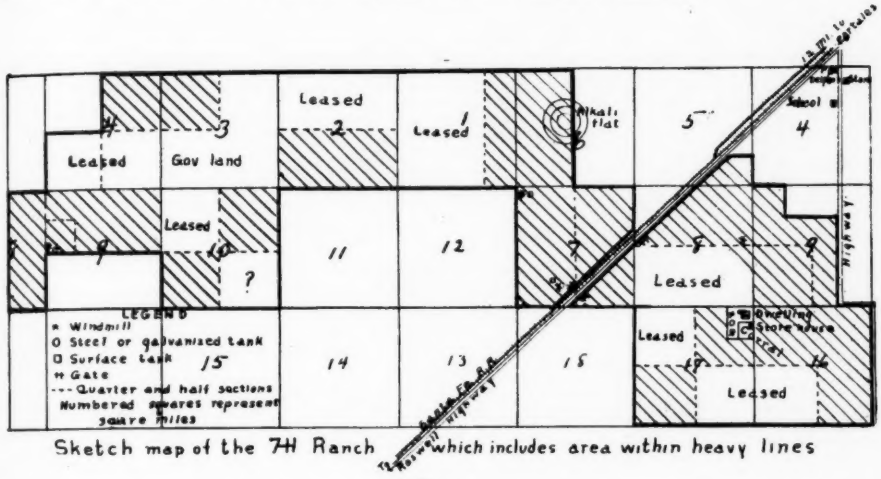

FIG. 1

On account of the uncertain character of the rainfall and the absence of surface water for irrigation, this region is rightfully considered the home of the herder rather than that of the farmer. The abundance of grasses affords very excellent pasturage for great herds of sheep and cattle. The more elevated portions to the west are covered with a scanty forest growth, valuable because of the scarcity of wood in most of this region.

The plains to the north and south of this New Mexico region are very similar to this area but differ in temperature mainly because of the difference in latitude. There are thousands of acres of grass on this high plain and water sufficient to meet all the needs of a ranch, if wells are bored to the depth of a few hundred feet. Here, as in the other places of the world where civilization is advanced, high plains are too dry for extensive agriculture but are devoted principally to the grazing industry. After the rounding up of the Indians and their

eviction, together with the practical extinction of the buffalo, this region was opened to cattle raising. But it never reached any great importance as a free range until after the better grazing lands in central and western Texas were taken up. The climate in the "7–H" ranch section is not so favorable as in the ranching areas of Texas. The winters are severe, from an economic standpoint, for cattle that remain in the open. The seasonal irregularity of the rainfall causes a variation in the supply of grass. It would be too expensive to provide barns for shelter for all the cattle and store room for all the fodder raised on the ranch.

GEOGRAPHY OF MR. HUNT'S RANCH

Mr. Hunt's ranch, however, is about as well favored as regards uniformity of weather conditions as any other ranch in the same latitude from West Texas to the eastern edge of California. This ranch lies without the normal storm track so that the sequences of weather changes are more uniform than those of ranches in more northern latitudes or in the same latitude farther east. Great extremes of temperature are uncommon, the air is dry and aseptic under nearly all conditions. As judged from the weather data of the nearby local bureaus, there is an abundance of sunshine, and clear, bright and beautiful days. The summers are long and extremely warm days are frequent but the rapid radiation renders the nights cool. On the "7–H" ranch the annual precipitation probably ranges from twelve to sixteen inches, but it comes at the most opportune time to serve the needs of the agriculturists as well as those of the stock growers. From November to April the precipitation is light, about twenty-five per cent of the annual fall, most of which occurs in the form of snow and thus protects the grasses and nourishes them better than the rain would as the rain causes the grass to lose its sweetness, rot and sour. The snow enables the dry grasses to retain nearly unimpaired their nutritive values, thus making winter pasturing possible on this "standing hay." This one climatic factor has almost removed the feeding problem for Mr. Hunt since he never has to feed except in long periods of drought and of heavy snows that cover up all the vegetation. During the six months of crop growth, May to October, inclusive, fully seventy-five per cent of the annual precipitation occurs with average monthly amounts of from two to four inches, sufficient, tho it has to be properly conserved, to bring to maturity many of the hardy plants and cereals. The need of feed to tide over the periods of drought and heavy snows forces Mr. Hunt

to practice "dry farming" as an adjunct to the cattle industry. Thus besides the native sun-cured short grasses, the buffalo grass, the gramma grass, and the mesquite grass which grow wild in abundance, maize, kaffir corn, sorghum, corn, feterita, and sudan are grown to supplement the pasturage when needed. The soil is fertile and the only problem which faces the owner, is one of moisture. The handling of this ranch, dry and semi-arid, is not so difficult as it once was because, by the "trial and error" method of experimentation on the part of Mr. Hunt and the close study of the farming methods which were used by his neighbors, favorable results have been accomplished in the production of feeds.

In order that he might have sufficient water to tide him thru a droughty season, extra wells were bored and wind mills set up. As will be noted in the accompanying chart of the ranch the wells have been set up in various sections. Fully three-fourths of the entire ranch could be put in cultivation yet Mr. Hunt only cultivates about 600 acres in Sections 7 and 8.

Problem of Communication

This ranch is located astride the Sante Fe Railway (See Map) with a switch near the northeast corner, thus making it suitably situated for quick transportation to market. The community store is only a short distance away, where the usual needs of the ranch may be purchased. If more special demands come, they can be met by shipments in a very short time. Besides the store, there is found the little school house, that no doubt plays as important a part in the life of the ranch as any other factor.

With all the improvements mentioned, as school, store, railroad facilities, and the natural supplies of water and grass, still Mr. Hunt has many vexing problems to solve. Among these is the problem of providing equipment for himself and for his helpers and these have to be brought from afar. Thanks to the auto truck which has brought the ranchman closer to his market, fuel, food, tools, and materials for shelter, fences, and mills can be secured in a minimum of time. At times under the stimulus of a high market the herd is greatly reduced and the next season finds him "short" on cattle. If he decides to increase the size of his herds, the extra supply has to be purchased from the neighbors or else imported from distant regions. Whether Mr. Hunt would thus increase his herd by outside purchases, or save from year to year the increase of his cattle or run short for a year, depended upon his judgment as to the future demand. It is this judgment that makes or breaks the ranchman.

WHY BRAND?

The lack of high standards of honesty upon the part of many individuals connected with this industry, who may live near by, has made necessary the adoption of a brand. This brand has to be registered with the authorities so that the owner's products may be protected while the thieves by the same means may be detected. The brand of Mr. Hunt is naturally "7–H" and it is this brand that gives the name to the ranch or vice versa. Thievery of cattle is practiced very little and the ranchman has little fear of loss from it. An inspector examines every animal shipped, and the local authorities are always on the watch for any irregularity. No doubt precaution has reduced the loss from this formerly common practice.

DAILY DUTIES

There are the daily duties of seeing that the wind mills are in running order. They must be kept oiled and after each storm, perhaps, repaired. Care is always taken to see that the tanks do not overflow, and in the winter time the ice has to be broken in the troughs and frozen pipes repaired. Often in the seasons of sandstorms the troughs may be completely filled with drifting sand. As water is as essential as grass for the cattle, these daily duties keep the ranchman close to his tasks.

Beside the close supervision of the water supply, "the fences have to be ridden." Most of these fences are made of three strands of barb wire with posts placed from twenty to one hundred feet apart. From observation it may be noted that the fences restrain the gentle cattle and mark the lines. If during a storm they stampede or for any other reason become incorrigible, they tear down the fences, and these will have to be repaired and the strayed cattle sought. This often brings the ranchman into close quarters with his neighbors. Here is seen the good of the brand—identification is made easy. With the daily trips to repair fences and keep the mills running, each pasture is studied as to the quality and quantity of grass there and the best time to change the cattle to another pasture to allow the first one to regain in growth.

THE ROUND UP

Many times during the hard winters the cattle have to be corralled for feeding or, as Mr. Hunt would express it, to be "put on the lift." This is often the case on many New Mexico ranches in the spring when the calves are young. After keeping these herds thru several

trying months, perhaps the report is brought to ranchman that some of his neighbors' cattle are sick and perhaps a few have died, so he hastily orders vaccine and has his cattle vaccinated. This calls for the "rounding up" of the cattle from the far pastures or canyons and breaks, and the "cutting out" of the ones to be vaccinated usually those ranging from six months to two years of age. This same practice is in vogue when the owner gets ready to ship. However, it may be that he will "cut out" those he wants to ship some weeks before he sells them that he may feed them intensively and thus receive a greater price for his products.

During the rushing season of shipping, it may be difficult to get railroad cars. All of his cattle must be inspected as they go on the cars so the inspectors are notified. The railroad officials are asked for cars at a certain time, sometimes in quantities sufficient to make train loads. The railroads are co-operating with the cattle-men, and making progress in providing special equipment to take care of every one of the cattleman's products.

Future of Ranching Industry in New Mexico

Ranching to-day is not what it was a few decades past, and by these recent changes dimly can we see what its future will be. The ranching industry is being pushed more and more to the drier portions of the West by the influx of the agriculturists who are "taking up" and using all the possible farming lands. Dry farming and the local utilization of irrigation, together with the rapid introduction of pure bred cattle are changing the aspects of the former cattle region. In many parts of eastern New Mexico where water is available, the land has been divided into small farms where truck gardening is being very profitably prosecuted. The early spring and the excellent transportation facilities enable New Mexico truck gardeners to gain the great profits of an early market in northern cities. Each one of these changes, together with the tightness of the financial market, has caused many ranches to be converted to other uses. There has been the cry from the ranch men for long time loans, yet these can be of little benefit in the long run. The opening up of new, cheap, grazing lands in various parts of the world and the growth of intensive agriculture are driving ranching as a special industry from the larger part of the Western Plains. Mr. Hunt is only one of the group who will be compelled to adjust himself to the new economic environment. The many thousands of acres in this region will continue to be used for grazing, the old method has passed out and the present system of

cattle raising will possibly in a few decades, evolve into a different system.

The region, west of the 100th meridian to the Rockies, has been the chief source of our cattle for scores of years. Cattle was its "one product." Altho the open range is a thing of the past this region is still supplying the large framed animals for the feeding farms of the corn belt, where they are intensively and scientifically fed, or "secondarily manufactured" for the great packing houses at Chicago, St. Louis, Omaha, Kansas City, Ft. Worth, and lesser centers. The United States for a long period of time has been producing plenty of cattle for its own markets and supplying large quantities for the markets of Europe, but it is losing its grasp. High prices of meat are tending to make us vegetarians, yet habit and prosperity will continue to make America a great market for all meat products and New Mexico and the West will long continue to be a large producer of "raw cattle" for the "World's Butcher Shop."

GEOGRAPHICAL PUBLICATIONS

Frank G. Carpenter. **North America.** 510 pp., 13 maps, 185 diagrams and photos. Am. Book Co., N. Y. 1922.

The lack of suitable elementary textbooks has made the supplementary reader a mainstay of geography in the fourth, fifth, and sixth grades. A wholesome desire has been growing among teachers for a newer type of supplementary reader having modern content and concept of geography.

The New Geographical Reader by Frank G. Carpenter may be the author's attempt to answer this demand; it is apparent that the passing of years has given reason to the author to rewrite the older book. The revised edition is similar in style, vocabulary, and organization to the older edition. The illustrations are modern views. Items of more recent interest replace those of earlier decades in this children's guide-book. Such topics as the building of Brooklyn Bridge and the historic fire have been omitted. Illustrative of the newer topics are the rise of Norfolk as a port, the mid-continent petroleum fields, the Keokuk dam, and the rubber industry of Akron. The book includes descriptions of purely historical and informational interest. The city of Washington as a city of government receives thirty-four pages of description. The description of the mint in Philadelphia will pass as a travelogue, but not as a description leading to principles of geography. Allusions to historical incidents, such as Paul Revere's ride are given too much space. The city of New York and the New England states receive good geographic treatment. In general the new book has better geographic interpretation and less of general information than the older edition. As a reader for the newer science geography, as a book to stimulate active geographic thinking, it contributes rather meagerly. As a descriptive, informational travelogue it is superior and will provide pleasurable supplementary reading.

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